

FRICITION HINGE DEVICE

FIELD OF THE INVENTION

This invention relates to hinge devices which are adapted to provide pivotal connection between parts of casings. The invention relates particularly, but not exclusively, to hinge devices used in the casings of portable computing devices.

BACKGROUND

Hinge devices are used for providing pivotal connection between different parts of casings of an apparatus. In certain applications, these pivoting parts must also have the capability of being held fast intermittently with respect to one another in varying orientations. As an example, in a portable computer having a tiltable lid, the lid is capable of being tilted through a range of angles, but is able to remain fixed in a particular inclination that the user selects to provide optimum visibility of the computer screen. In order for a hinge device to be intermittently held fast in a variety of selected orientations, a certain degree of internal friction must be present within the hinge device. In the example of the portable computer, the amount of internal friction must be sufficient to secure the lid in a selected angle of inclination when the user does not move the lid. The amount of friction, however, must not be so great as to cause difficulty when moving the lid intentionally.

Moving parts within a hinge device must maintain high dimensional accuracy and must fit together precisely. However, the presence of such internal friction between moving parts of a hinge device may cause the parts to lose their original alignment through wear caused by the friction. Over the long term life of a hinge device, misalignment may also result from the frictional forces acting to move the parts out of their original alignment.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a hinge device for pivotally connecting first and second parts of a casing. The hinge device comprises an outer housing member which defines a hollow portion. The hinge device is also has an inner shaft member that is provided with lateral surfaces and non-metallic frictional material disposed about the shaft member. The frictional material is frictionally and rotatably positioned within the hollow portion of the outer housing member in substantial co-axial alignment. The lateral surfaces of the inner shaft member are distanced from the outer housing member. The outer housing member and the inner shaft member are each adapted for connection to one of the first and second parts of the casing, such that rotation of the inner shaft member within the hollow portion causes pivotal motion between the parts of the casing. The parts are able to be releasably positioned at plural oblique and acute pivotal orientations with respect to one another due to friction between the frictional material and the hollow portion.

Preferably, regions of the lateral surfaces of the inner shaft member are distanced from the outer housing member by space therebetween, and other regions of the lateral surfaces are distanced by being separated by the frictional material from the outer housing member.

Preferably, the frictional material is disposed so as to be substantially motionless with respect to the inner shaft member and is rotatable with respect to the hollow portion of the outer housing member when the inner shaft member rotates within the hollow portion.

Preferably, the frictional material is characterised in that it provides higher lubricity when the inner shaft member rotates within the hollow portion of the outer housing member at higher speeds, but provides lower lubricity when the rotation is at lower speeds.

The frictional material may also be characterised in that it provides lower friction at higher speeds, but provides higher friction at lower speeds.

Preferably, the frictional material has a degree of resilience sufficient to allow the frictional material to releasably grip the outer housing member when the inner shaft member is stationary within the hollow portion of the outer housing member.

Preferably, the inner shaft member is provided with a locking mechanism for locking the frictional material to the inner shaft member such that the frictional material is substantially motionless with respect to the inner shaft member.

Preferably, the frictional material and the inner shaft member are each provided with a locking mechanism configured to mutually engage the frictional material and the inner shaft member which causes the frictional material to be substantially motionless with respect to the inner shaft member.

Preferably, the locking mechanism of the frictional material defines a hollow region shaped so as to allow the locking mechanism of the inner shaft member to fit therethrough.

Preferably, each of the outer housing member and the inner shaft member is provided with a connector mechanism to allow connection of each member to one of the different parts.

Preferably, the connector mechanism of the outer housing member may be in the form of a lever arm that protrudes radially from the outer housing member such that application of a force to the lever arm causes the outer housing member to rotate about its axis.

Alternatively, the connector mechanism of the inner shaft member may be in the form of a lever arm that protrudes radially from the inner shaft member such that application of a force to the lever arm causes the inner shaft member to rotate about its axis.

The connector mechanism may also comprise a slot that is transverse to the rotational axis of the member such that rotation of the slot causes the member to rotate about its axis.

According to another aspect of the invention, there is provided a computing device having a casing which includes first and second moving parts. The computing device comprises an outer housing member which defines a hollow portion. The hinge device is also has an inner shaft member that is provided with lateral surfaces and non-metallic frictional material disposed about the shaft member. The frictional material is frictionally and rotatably positioned within the hollow portion of the outer housing member in substantial co-axial alignment. The lateral surfaces of the inner shaft member are distanced from the outer housing member. The outer housing member and the inner shaft member are each adapted for connection to one of the first and second parts of the casing, such that rotation of the inner shaft member within the hollow portion causes pivotal motion between the parts of the casing. The parts are able to be releasably positioned at plural oblique and acute pivotal orientations with respect to one another due to friction between the frictional material and the hollow portion.

An object of the present invention is to minimise the adverse effects of internal friction which, necessarily, has to